

U.S. Patent Application Serial No. 10/593,644

Response filed October 24, 2008

Reply to OA dated July 24, 2008

**REMARKS**

Claims 1-9 are pending in this application. Claims 1 and 2 are amended herein. Upon entry of this amendment, claims 1-9 will be pending. Entry of this amendment and reconsideration of the rejections are respectfully requested.

No new matter has been introduced by this Amendment. Support for the amendments to the claims is discussed below.

**The information disclosure statement filed March 11, 2008 fails to comply with 37 CFR §1.97(c) because it lacks a statement as specified in 37 CFR 1.97(e).** (Office action paragraph no. 4)

**The information disclosure statement filed March 11, 2008 fails to comply with 37 CFR §1.97(c) because it lacks the fee set forth in 37 CFR 1.17(p).** (Office action paragraph no. 5)

Applicant has filed a Communication to the Examiner dated August 20, 2008, providing evidence that the Information Disclosure Statement filed on March 11, 2008, **was** proper and **did** include the statement under 37 CFR 1.97(e). As explained in the Communication, it appears that the USPTO lost the first two pages of the filed IDS. Applicant also notes that no fee was required for the IDS dated March 11, 2008, although the Commissioner was authorized to charge any required fee to a specified deposit account. Applicant therefore respectfully notes that the Information

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Disclosure Statement was entitled to consideration when it was filed, and Applicant requests consideration of the Information Disclosure Statement filed on March 11, 2008.

**Claims 1, 3, 4, 6, and 7 are rejected under 35 U.S.C. §103(a) as being unpatentable over Takagi et al. (US 4,443,650), in view of Funahashi et al. (JP Publication No. 2003-306381) and Mizutani (JP Publication No. 2003-008086).** (Office action paragraph no. 7)

The rejection is overcome by the amendments to the claims. The amendments are as follows:

In claim 1, the complex oxide of Formula (3) has been deleted, and the claim has been amended to recite a complex oxide represented by Formula:  $Ln_xR^5_yNi_pR^6_qO_r$ . Support for this oxide may be found in the specification of the present application on page 11, lines 5 to 11, and in original claim 2. In the amended claim 1, Mn, Fe, and Co are not included in the definition of  $R^6$  in the formula. In addition, in claim 1, Al is deleted from the definition of A in Formula (5).

In claim 2, the oxide represented by Formula:  $Ln_mR^1_nNiO_r$  is deleted as a possible complex oxide. Additionally, Mn, Fe, and Co are deleted from the definition of  $R^6$  in Formula:  $Ln_xR^5_yNi_pR^6_qO_r$ .

Takagi et al. (US Pat. No. 4,443,650) is cited in the Office Action as disclosing a thermoelectric converter element comprising a p-type thermoelectric material and an n-type thermoelectric material electrically connected to each other. In column 2, line 58, to column 3, line 8, manners in which a p-type thermoelectric material film and an n-type thermoelectric material film

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are formed on a substrate, and in which “one ends of these films are electrically connected to each other” are described.

The Examiner states that Takagi et al. fails to disclose the p-type thermoelectric material and n-type thermoelectric material comprising specific complex oxides for use in the present invention.

In this regard, the Examiner cites Funahashi et al. (JP Publication No 2003-306381), stating that the p-type thermoelectric material represented by  $\text{Bi}_{1.6-2.2}\text{Pb}_{0-0.5}\text{Sr}_{1.6-2.2}\text{Co}_2\text{O}_{8.6-9.4}$  is known, and further cites Mizutani (JP Publication No. 2003-008086), stating that the n-type thermoelectric material represented by  $\text{L}_p\text{A}_{p-1}(\text{Co}_z\text{Ni}_q\text{B}_{1-z-q})_x\text{O}_y$  is known.

As noted above, in the present amendment, the complex oxide represented by Formula (3):  $\text{Ln}_m\text{R}^1\text{Ni}_p\text{R}^2\text{O}_r$  is deleted from the n-type thermoelectric material recited in claim 1; a complex oxide represented by Formula:  $\text{Ln}_x\text{R}^5\text{Ni}_p\text{R}^6\text{O}_r$  is newly added as an n-type thermoelectric material, with  $\text{R}^6$  is defined as one or more elements selected from the group consisting of Ti, V, Cr, and Cu. Furthermore, the above-mentioned formula has a condition  $0.01 \leq q' \leq 0.5$ . Accordingly, the complex oxide is defined as a complex oxide containing one or more elements selected from the group consisting of Ti, V, Cr, and Cu.

In Mizutani, in the complex oxide represented by Formula:  $\text{L}_p\text{A}_{p-1}(\text{Co}_z\text{Ni}_q\text{B}_{1-z-q})_x\text{O}_y$ ,  $\text{B}$  is defined as an element of one or more types selected from the group consisting of Mn, Fe and Zn (see the English abstract). Therefore, it is clear that Mizutani's complex oxide represented by  $\text{L}_p\text{A}_{p-1}(\text{Co}_z\text{Ni}_q\text{B}_{1-z-q})_x\text{O}_y$ , which does not contain Ti, V, Cr, or Cu, is not within the scope of the complex

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oxide used as an n-type thermoelectric material in claim 1 of the present application, which is represented by Formula:  $Ln_xR_yNi_pR_qO_r$ .

Further, the complex oxide represented by Formula:  $Ln_mR_nNiO_r$  is deleted from claim 2 of the present application. In claim 2,  $R^6$  is also limited to one or more elements selected from the group consisting of Ti, V, Cr, and Cu.

Accordingly, the n-type thermoelectric material used in the thermoelectric element in amended claims 1 and 2 is clearly distinguished from the material recited in Mizutani. Although Takagi et al. discloses a thermoelectric converter element comprising a p-type thermoelectric material and an n-type thermoelectric material electrically connected to each other, it nowhere describes the specific p-type and n-type thermoelectric materials as used in the present invention. Funahashi also does not disclose the n-type material of amended claims 1 and 2.

Moreover, the thermoelectric element of the present invention is characterized in that the thin film of the p-type thermoelectric material and the thin film of the n-type thermoelectric material are formed on an electrically insulating substrate and one end of the p-type thermoelectric material and one end of the n-type thermoelectric material are electrically connected; and in that combinations of specific complex oxides are used respectively as the p-type thermoelectric material and the n-type thermoelectric material. With such a thermoelectric element, it becomes possible to obtain an element ensuring a high thermoelectric conversion rate and desirable electrical conductivity, as well as to form the thermoelectric material on various substrates of arbitrary shapes.

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Therefore, the cited references cannot be combined to produce the amended claims. In addition, the excellent effects associated with the claimed combination of the specific p-type and n-type thermoelectric materials are clearly unexpected over the prior art. Therefore, claims 1 to 4, 6 and 7 are not obvious over Takagi et al., Funahashi et al. and Mizutani, taken separately or in combination.

**Claims 5, 8 and 9 are rejected under 35 U.S.C. §103(a) as being unpatentable over Takagi et al. (US 4,443,650), Funahashi et al. (JP Publication No. 2003-306381) and Mizutani (JP Publication No. 2003-008086) as applied to claim 1 above, and further in view of Buist (US 4,859,250). (Office action paragraph no. 8)**

The rejection of claims 5, 8 and 9 is overcome by the amendments to claim 1. As discussed above, base claim 1, as amended, is not obvious over the combination of Takagi et al., Funahashi et al. and Mizutani, because these references fail to disclose the n-type complex oxides of the amended claim.

The invention of Buist is directed to a thermoelectric heat pump or a power source device comprising p-type and n-type materials, and teaches plastic materials such as MYLAR, TEFLON, etc. as substrate materials. In addition, Buist discloses a device in which the elements are connected in the similar manner to that defined in claim 8. Buist, however, nowhere discloses the specific complex oxides recited in claim 1.

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Therefore, the combination of Buist with Takagi et al., Funahashi et al. and Mizutani, does not provide the specific complex oxides recited in claim 1.

Accordingly, claims 5, 8 and 9 are not obvious over Takagi et al., Funahashi et al., Mizutani and Buist, taken separately or in combination.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicants' undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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